

**UNITED STATES DISTRICT COURT  
DISTRICT OF MINNESOTA**

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In re: BAIR HUGGER FORCED AIR  
WARMING DEVICES PRODUCTS  
LIABILITY LITIGATION

MDL No. 15-2666 (JNE/FLN)

This Document Relates To:  
All Actions

**DECLARATION OF ALBERT VAN  
DUREN IN SUPPORT OF  
DEFENDANTS' MOTION FOR  
PROTECTIVE ORDER  
CONCERNING PLAINTIFFS'  
SUBPOENAS TO THIRD-PARTY  
MANUFACTURERS OF PATIENT  
WARMING DEVICES**

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I, ALBERT VAN DUREN, do declare and state the following:

1. I am Director of Scientific Affairs and Education, Patient Warming Business, Infection Prevention Division at 3M Company ("3M"). I have been an employee of 3M since October of 2010.

2. I submit this declaration at the request of counsel for 3M. I understand from 3M's counsel that the facts stated in this declaration will be used in support of Defendants' Motion for Protection From Plaintiffs' Subpoenas to Third-Party Manufacturers.

3. All of my statements in this Declaration are based on my personal knowledge, education, training and experience in methods and modalities of heat transfer, including courses in bioheat transfer; convection, conduction and radiation heat transfer; compressible fluids; and thermodynamics. My statements in this Declaration are also based on my knowledge and many years of experience in heat transfer modalities in patient warming systems, including the Bair Hugger Patient Warming System, and my knowledge

and experience of patient warming systems working at 3M. Finally, my Declaration statements are based on information I obtained through my review of the public information available concerning the following conductive patient warming devices: Blanketrol III (Cincinnati Sub-Zero), PerfecTemp (Medline Industries), Medi-Therm (Stryker), and Allon (MTRE).

4. The Bair Hugger Patient Warming System is a *convective* warming system, meaning that heat is transferred by the movement of warm air. With *convective* warming, heat is transferred from warm air to a surface. The Bair Hugger warming unit generates temperature-controlled warm air, which is then delivered into a blanket with small perforations. Heat transfer is accomplished through the gentle dispersion of warmed air through the small perforations in the Bair Hugger blanket across the patient's skin. Temperature, air velocity and recruited surface area are key elements in a convective patient warming system.

5. The Blanketrol III, PerfecTemp, Medi-Therm and Allon patient warming systems employ *conductive* warming (i.e., heat transferred by direct contact such as an electric heating pad or heated water bottle). A *conductive* warming system warms patient primarily by the transfer of heat through direct surface-to-surface contact. By the direct contact between two surfaces, such as a heating pad touching a patient's skin, heat is transferred from a warmer to a cooler surface. There is no movement of air in heat transfer through conduction. Examples of conductive heat transfer are an electric heating pad, a heated water bottle or water mattress, heated gel pads, or a conductive table pad. Temperature and contact area are key elements in a conductive patient warming system.

6. In essence, convective warming technology is completely different from conductive warming technology. The difference between a convective patient warming system and a conductive patient warming system is the difference between heat transfer by air movement and heat transfer by direct surface-to-surface contact. Accordingly, conductive direct surface-to-surface heat transfer cannot be re-engineered and incorporated into convective air-to-surface heat transfer. The conductive warming technology of the Blanketrol III, PerfecTemp, Medi-Therm and Allon systems cannot be incorporated into the Bair Hugger system.

7. It is my understanding that the Blanketrol III, Medi-Therm and Allon systems are water temperature management systems. Heated water flows through a mattress or body wrap to transfer heat from the mattress or body wrap to a patient's skin. The patient is placed on the water mattress or the body wrap is wrapped around various parts of the body which creates direct surface-to-surface contact in order to accomplish heat transfer.

8. It is also my understanding that the PerfecTemp system employs an underbody conductive mattress. The patient is placed on the underbody mattress, thus creating direct surface-to-surface contact in order to accomplish heat transfer.

9. Without this surface-to-surface contact in conductive systems like the Blanketrol III, PerfecTemp, Medi-Therm and Allon, little heat could be transferred to the patient. Just like an electric heating pad, if an individual is not touching the heating pad, the electric heating pad cannot transfer much heat to the individual.



10. In a convective patient warming system, such as the Bair Hugger patient warming system, it is the air movement that transfers heat to a patient. Direct surface-to-surface contact is not essential to the heat transfer process. An example of convective warming is a typical airflow space heater an individual may purchase to warm a living room or bedroom. The individual does not need direct contact with the space heater in order to receive the warm air the space heater transfers.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

Executed on: March 10, 2017



Albert Van Duren